



## High Power, High Energy Density Lithium-Ion Batteries



**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**

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# Project Overview



## Title of Project

High Power, High Energy Density Lithium-Ion Batteries

## Objective

- To improve the current, limited manufacturing capability of 30 Amp-hr battery cells and to provide affordable Lithium-Ion battery packs for the combat and tactical vehicle systems.
- To address the manufacturing processes that will reduce cost of lithium-ion battery packs by one half through the improvement of manufacturing process to enhance production consistency and increase the production yield of high power lithium-ion cells.

Improved VL30P design to develop the VL34P; **14% Improvement in Energy Density; 11% Improvement in Weight; 75% Improvement in Power Density; 63% Reduction in Cell Labor Hours**

**Automated manufacturing process** for lithium-ion batteries

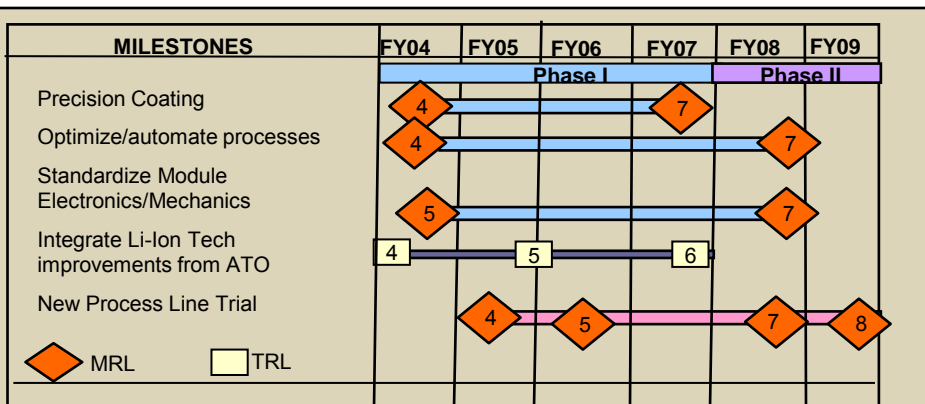
**Safety** – New lithium-iron phosphate product line developed and reports describing safety and reliability resulting from operating high temps and development of pressure activated circuit breaker and improved battery cooling.

## Cost Reduction

**Impacted several programs such as: Improved Targeted Acquisition System (ITAS) with Army, and Joint Strike Fighter (JSF) with NAVY/AIRFORCE :**  
Leveraging of technical capabilities, cost reduction, cell design improvements, and manufacturing improvements

**Transitioned** an automated manufacturing process to produce lithium-ion battery cells and modules to ARMY, NAVY, and Air Force

## SCHEDULE OF KEY MILESTONES



Start Date: July 2004  
Funding End Date: FY 2010

Project Implemented: Dec 2009  
Contract End Date: Feb 2011

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# Manufacturing Technology Achievement



**Description:** The ManTech Program achieved significant milestones in labor reduction, material handling improvements, performance improvements, product safety and cost which developed technology that was implemented across a wide variety of military applications

## **Uniqueness & Improvements include:**

Labor Reduction: The labor required to produce a cell dropped to a third of the baseline touch time.

- Material Handling Improvements: The distance needed to manufacture a cell reduced to half of the baseline. Battery manufacturing achieved a 6 fold reduction in travel distance. These improvements in product handling result in lowered cost and reduced scrap.
- Performance Improvements: The target application achieved a 50% power improvement and 75% volumetric energy density improvement. These improvements far exceeded what the team thought was possible and will allow additional applications for Li-ion technology.
- Product Safety: The program has been able to improve product safety in cell design and in improved electrode processes. These safety improvements have been demonstrated on full system abuse tests.
- Cost: One key program metric was to demonstrate cost reductions at a set production volume. Even in advance of the full production volumes, the program has been able to provide enough savings to pay for the program in deliverable orders for a single program.
- A critical technology requirement or operational need that was addressed was the affordable, automated, domestic supply of safe and reliable batteries for military use.